Feb. 14, 1933. C. L. KELLER 1,897,056

BRIDGE

Filed Oct. 21, 1930 3 Sheets-Sheet 1

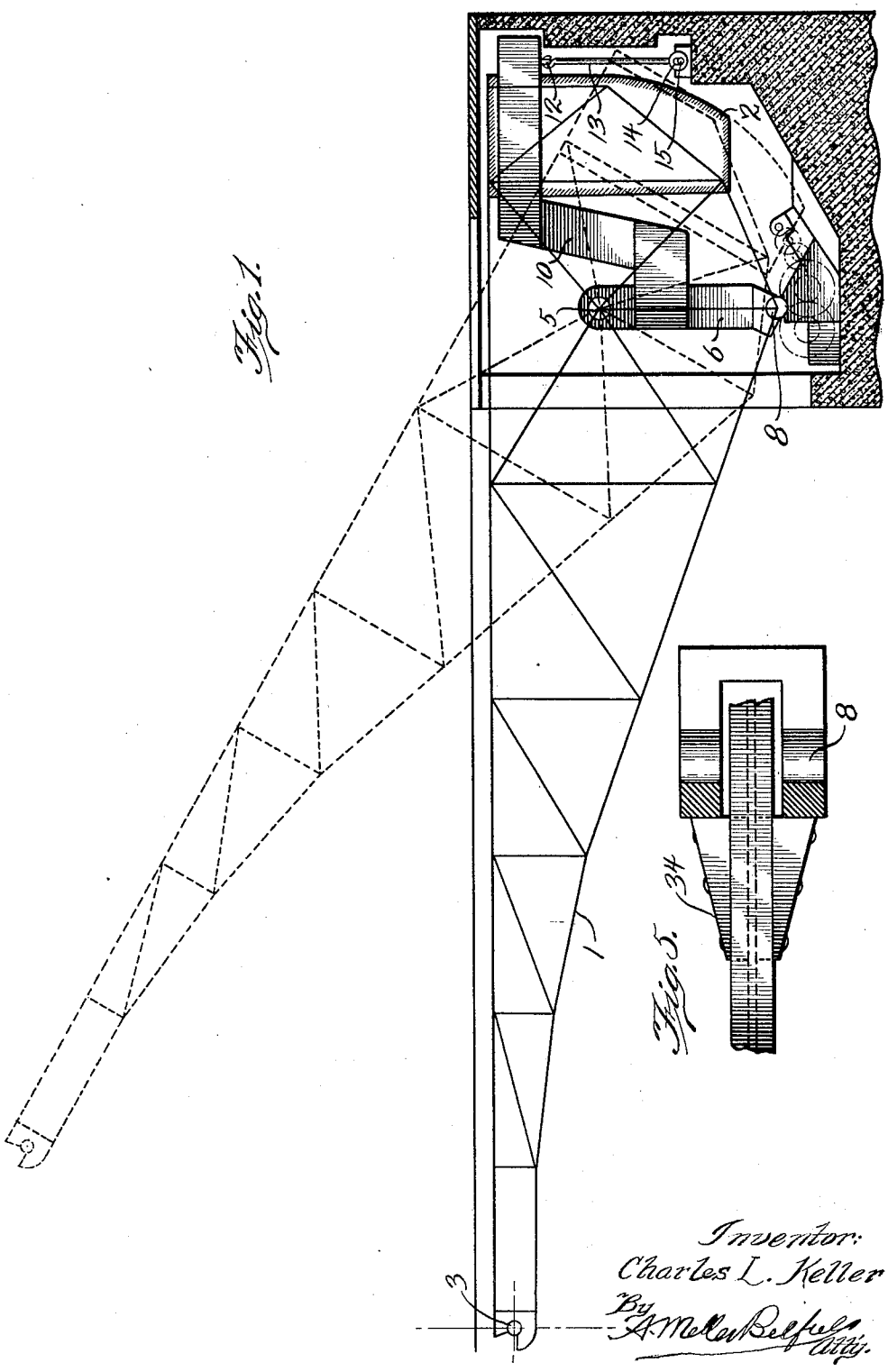

Fig. 1.

Fig. 5.

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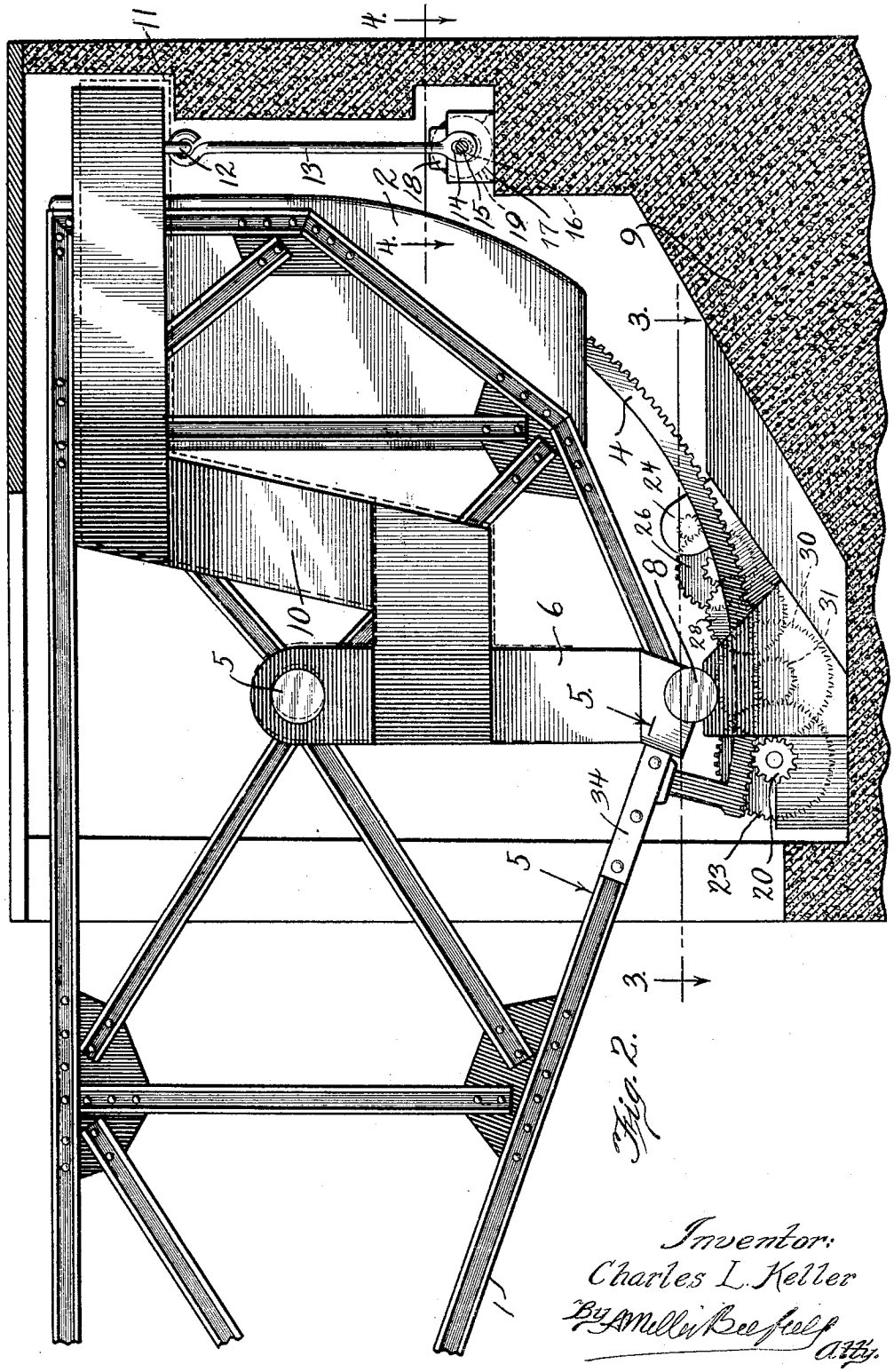

Fig. 2.

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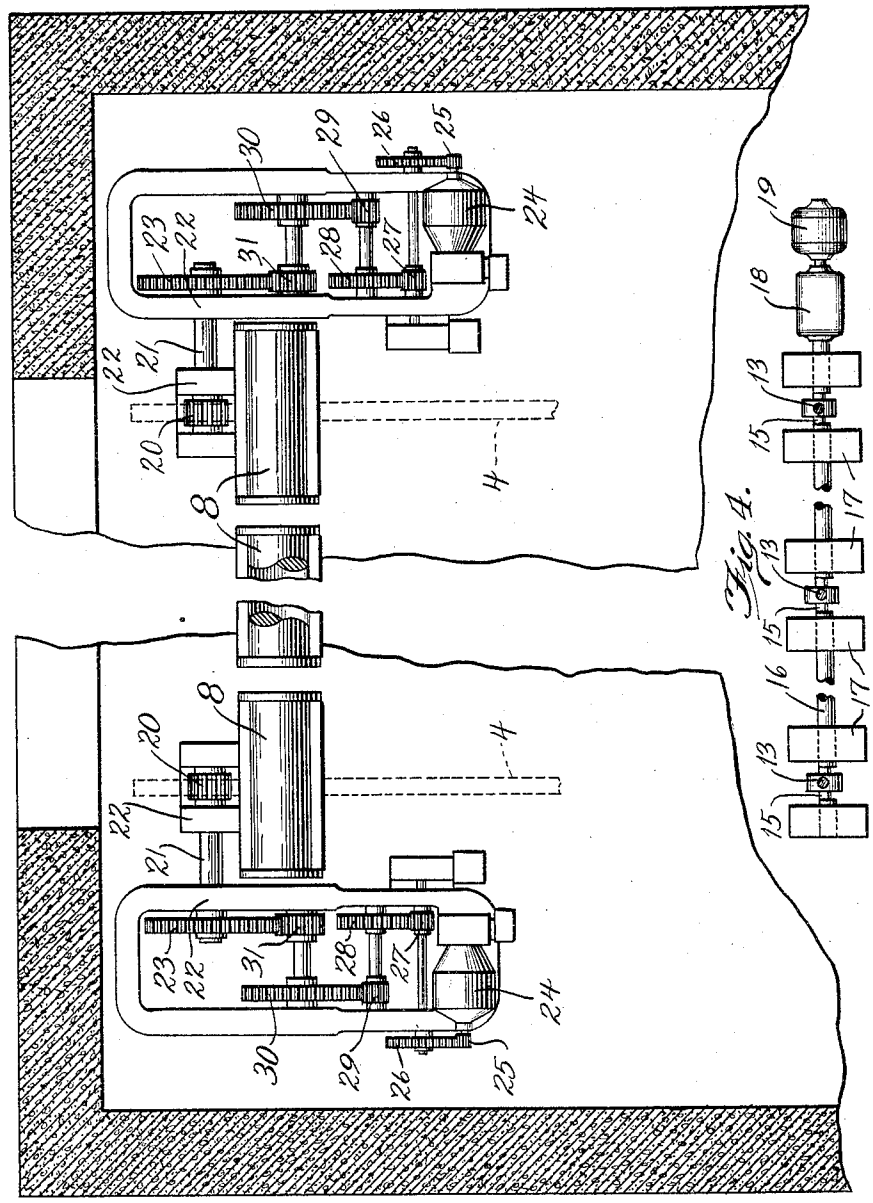

Fig. 3.

Fig. 4.

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Patented Feb. 14, 1933

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UNITED STATES PATENT OFFICE

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BRIDGE

Application filed October 21, 1930. Serial No. 490,196.

The present invention relates in general to bridges and more particularly to bridges of the bascule type.

One of the objects of the present invention is to adapt the principle of the arch to bascule construction.

Another object is to provide simple and efficient means for taking care of the stresses arising from expansion and contraction as a result of variation in temperature in the elements of which the bridge is constructed.

Another object is to provide mechanism for transferring the suspension points of the bridge in order to provide for a better utilization of the arch principle.

A further object is to provide means for transferring the load stresses into slight horizontal movements to eliminate whipping action.

There are other objects of the invention which, together with the foregoing, will be described in the detailed specification that is to follow, taken in conjunction with the accompanying drawings forming a part thereof.

The majority of bascule bridges in use heretofore have employed the cantilever principle. Bridges of this type are all subject to the objection that, on the transfer of load from one leaf of the bridge to the other, a whipping action is brought about that is very undesirable. By the utilization of the arch principle I have been able to eliminate this whipping action entirely and also to provide a convenient method which permits the stresses arising from temperature variation to be taken care of. It is difficult, when this arch principle is employed, to provide a convenient arrangement for opening the bridge, and I have provided an arrangement for changing the points of suspension of the bridge at the time it is opened so that my improved bridge may be opened in the same manner as the usual bascule type cantilever bridge.

This application is a continuation in part of my copending application, Serial No. 121,789, filed July 12, 1926.

In practicing my invention, I provide a pair of bascule leaves that are adapted to rotate about a pivot mounted on a support that is permitted to oscillate within certain limits at certain times. When the bridge is to be opened, the support is held rigidly in position and the opening of the leaves occurs around a pivot in the support. When the bridge is closed, the supporting point of the leaves is changed from the first pivot to a pivot at the base of the support and slight oscillation of the support is permitted to provide for stresses arising from temperature changes, as well as from the transfer of load from one leaf to the other. The transfer of these points of suspension, or pivot points, provides a more rigid arch construction and at the same time takes care of the stresses mentioned.

Referring now to the drawings:

Fig. 1 is a side elevation of one leaf of my improved bridge together with its operating mechanism;

Fig. 2 is an enlarged elevation of the operating mechanism therefor and of one of the supports;

Fig. 3 is a sectional view thereof taken on the line 3—3 of Fig. 2, looking in the direction of the arrows;

Fig. 4 is another section along the line 4—4 of Fig. 2 showing details of the anchor operating mechanism; and

Fig. 5 is a detailed section taken along the line 5—5 of Fig. 2 looking in the direction of the arrows.

In the drawings, like reference characters apply to similar parts throughout.

The reference character 1 designates one leaf of my improved bridge which is constructed in any usual or well known manner from structural steel shapes. The leaf 1 is provided with a suitable counterweight 2 at its lower end and also with a locking mechanism comprising a pin 3. The lower end of the bridge is provided with two racks 4 for bringing about its rotation about a pivot or bearing 5 mounted in a support 6, rotatably carried in a base member 7 by bearings or trunnions 8. The base member is supported upon an abutment or base 9. Supporting members 6 are provided with extensions 10 of the shape shown, fitting into a recess 11

in the base 9 and fastened at their outer end through an eye 12 to an anchor member 13 which is provided with an elongated opening 14 at its lower end into which is fitted an eccentrically shaped cam 15 mounted upon a shaft 16, supported in bearings 17 on the base 9.

The shaft 16 is connected through a speed reducer 18 to a small motor 19.

The operation of the cam 15 is such that the anchor member 13 is placed under tension in one position so as to prevent any oscillatory movement of the extension member 10 and the support 6 about the pivot 8 in one position, and in the other position of the cam to permit a few inches of play in the anchor member 13, thereby enabling the support 6 to move about the pivot 8 and bring about some oscillatory movement of the extension member 10 in response to internal stresses arising from temperature in the leaf member 2 or to take care of stresses arising from loads on the bridge.

A pinion 20, mounted upon a shaft 21, carried in bearings 22, is adapted to mesh with each of the racks 4 of the leaf member 2 and provide means for operating the leaf members. The spur gears 23 are adapted to be operated by operating motors 24 through suitable gear trains comprising gears 25, 26, 27, 28, 29, 30 and 31.

When the bridge is opened, the motor 19 is first operated to shift the cam member 15 so as to tension the anchor 13 and prevent any movement of the support 10 and the column 6. The motors 24 are then operated to rotate the pinions 20 and open the leaves 1 by movements of the chord racks 4. counterweights 3 serving to balance the leaves 1 about the pivot 5.

When the bridge is closed the motor 19 is operated so as to release the cam 15, permitting several inches of play in the anchor members 13. The closing of the leaves 1 locks the two leaves on the pin 3 and brings about a lateral shifting of the member 6 to a slight extent so that it is supported at the point 8. The movement of the leaves 1 is such as to bring them into engagement with the stops 34. The two leaves 1 thus form an arch structure supported at the pin 3, members 34 and the trunnions 8. The anchor members 13, being loose, permit this slight shifting of the member 6. Any expansion or contraction arising from temperature changes permit further oscillatory movement of the support 6 about the trunnion 8 and consequently of the extension member 10. That is, as a result of my invention, I utilize the principle of the arch so that the live load at all times is taken upon the members 34 and thence to the base 9. The lower trunnion 8 at all times also carries the dead load through the column 6. In former bascule bridges, the live load is ordinarily taken about the trunnion 5 and is then transferred to the base through a rigid support. Therefore my invention provides for the transfer of the live load to a point near the lower trunnion to secure a better utilization of the arch principle.

The anchors 13 are not wholly released in order to maintain the bridge within certain limits of rigidity at all times. The movement of the load from one leaf of the bridge to the other brings about stresses which are taken care of by the oscillatory movement of the members 6 and 10 in the manner described. The shifting of the support of the two leaves 1 from the pivots 5 to the points 8 brings about a more firm and rigid arch structure. When the bridge is opened, the anchors 13 are tightened so that there is no oscillation whatsoever of the column 6 about the trunnions 8, and the bridge may be opened in the same manner as the usual bascule type cantilever bridge.

While I have described a certain specific embodiment of my invention, I am aware that many changes, variations and departures may be made, coming within the scope of my invention, as set forth in the appended claims.

I claim:

1. In a device of the class specified, a pivotally mounted bridge member having an oscillatable support, said support comprising a substantially vertical member having a pivot at its upper end for said bridge member, a pivot at its lower end, and an outwardly and upwardly extending member for limiting the movement of said first mentioned pivot.

2. In a device of the class specified, a pivotally mounted bridge member and a swinging support, said support comprising a member having upper and lower pivots and an extension connected thereto between said pivots, said extension having means comprising a link and an abutment for limiting movement of said upper pivot.

3. A bascule lift bridge comprising a swinging leaf, a support upon which said leaf is rotatably mounted, counterweight for said leaf, an extension for said support, an anchoring member connected to said extension and means for releasing said anchor.

4. A bascule lift bridge comprising a swinging leaf, a support upon which said leaf is rotatably mounted, counterweight for said leaf, an extension for said support, an anchoring member connected to said extension and means for permitting play in said anchor when the leaf is in horizontal position.

5. A bascule lift bridge comprising a swinging leaf, a support upon which said leaf is rotatably mounted, counterweight for said leaf, an extension for said support, an anchoring member connected to said extension, means for holding said anchor rigid when the leaf is open and means for permitting play in the anchor when the bridge is closed.

6. In a device of the class specified a swinging bridge member and an oscillatory support, said support comprising an upstanding column having an extension member for stabilizing said column.

7. In a device of the class specified, a swinging bridge member and a swinging support, said support comprising a member having a movable pivot for said bridge member and having a fixed pivot substantially below said movable pivot.

8. In a device of the class specified, a pivotally mounted bridge member having an oscillatable support, said support comprising a substantially vertical member having a pivot at its upper end for said bridge member, a pivot at its lower end, and an outwardly and upwardly extending member for limiting the movement of said first mentioned pivot.

In witness whereof, I hereunto subscribe my name this 3rd day of October, A. D., 1930.

CHARLES L. KELLER.